REMARKS

Applicants appreciate the Examiner's consideration of the present application. The present application contains six independent claims 1, 9, 35, 36, 43 and 44. Claims 1-9, 11, 13, 22, 35, 40, 41, 43 and 44 are as amended on February 24, 2003. The reminder of the claims is as filed on September 1, 2000.

The present invention is directed to the transformation of objects between layers in a metadata model (e.g., claims 1 and 9) or within a layer of the metadata model (e.g., claim 9)). As recited in claim 1, a model object in a layer with a lower degree of abstraction is transformed and a new model object is created in a higher layer with a higher degree of abstraction. Thus, an object in a source database is represented as multiple model objects in the metadata model.

Rejection under 35 USC 103(a) to claims 1-8, 35 and 43-44

The Examiner has rejected claims 1-8, 35 and 43-44 under 35 U.S.C. 103(a) stating that these claims are unpatentable over Baisley et al (US Patent No. 6,292,932 - hereinafter called "Baisley"). Applicants respectfully request reconsideration of the rejection based on the reasons set out below.

The present invention as recited in independent claims 1, 35, 43 and 44 is for transforming a metadata model. The present invention as recited in independent claims 1, 35, 43 and 44 transforms a metadata model by obtaining information from objects in a layer of the model, abstracting that information by adding business intelligence, and creating objects in the same or higher layer of that model. The present invention as recited also transforms a metadata model by obtaining information from objects in a layer of the model, modifying the obtained information, and transforming the objects based on the modified information.

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Baisley discloses a system and method for converting a model based on the Unified Modeling Language (UML) to a model based on the Meta Object Facility (MOF).

To contrast the two inventions, Baisley describes a technique to translate a model in one language (UML) into another (MOF). The present invention describes a technique in which objects in a single model are examined and manipulated through adding business intelligence to create additional objects in the same model.

Baisley discloses a meta-model and meta-meta-model. In column 3, lines 9-12, a "meta-model" is defined as a model that defines an abstract language for expressing other models. In other words, a meta-model is a model of a model, and a meta-meta-model is a model of a model of a model. Each meta- prefix means an additional level of abstraction. Since a model and its meta-model are different models, an object in the model and an object in the meta-model are parts of different models.

The present invention describes layers within the model. As disclosed in the present invention, a lower layer contains objects with a lower abstraction and a higher layer contains objects with a higher abstraction. All of these objects are part of the same model.

Appendix A illustrates these correspondences. Baisley's UML model and MOF model are different models and are illustrated side by side. Baisley discloses UML as the meta-meta-model, and a meta-model described in UML. These models are shown in a vertical fashion to reflect the "meta-" relationship between these models. To the right of these models, the MOF meta-model and meta-meta-model are shown vertically to represent the "meta-" relationship between these models. The horizontal alignment reflects the common placement of the models in the various levels of abstraction defined by the "meta-" relationship.

While the UML meta-model and MOF meta-model are not related to each other, they fall within the same abstraction level. The right side of the diagram shows the meta-model of the present invention. The meta-model defines three layers (physical, business, and package). Below the meta-model is an example model that conforms to the meta-model disclosed in the present invention. It contains objects that are contained by each layer defined by the meta-model. These objects are all part of the same model.

Thus, Baisley does not disclose or suggest any metadata model "having a lower layer containing one or more model objects having a lower degree of abstraction and a higher layer containing one or more model objects having a higher degree of abstraction" as recited in claims 1, 35, 43 and 44 of the present application.

In the example shown in Appendix A, Table in the data access layer, Entity in the business layer and Subject in the package layer are all objects in the metadata model. Table in the data access layer is instantiated as COURSE, STUDENT_IN_COURSE and STUDENT. Thus, "course" in a source database is represented as COURSE in the data access layer, as Courses in the business layer and as Courses in the package layer as shown in Appendix A. The transformation is carried out within the same metadata model

By contrast, Baisley's invention relates to translation of Classes in the UML model to Types in the MOF model. This is illustrated in Appendix A with arrows from C1, C2 in the UML model to T1, T2 in the MOF model. Baisley does not disclose any transformation of objects within a model or creation of new objects within a model for representing the same object or table in its underlying database. While Baisley uses the terms "converting" (e.g., title), "translate" (e.g., column 3, line 26) and "transforming" (e.g., column 3, line 29) interchangeably, what Baisley's system does is translation from one modeling language to another to convert one model to another. Baisley does not disclose or suggest any transformation of a model by creating a model object within the same model.

As the Examiner has kindly indicated, Baisley does not teach means for abstracting the information by adding business intelligence. The set of rules disclosed in column 3, lines 28-29 is to generate a MOF model from any UML model. These rules are used to translate a UML model to a MOF model, as illustrated as the arrows in Appendix A. These rules are not to transform a UML model into a transformed UML model, or a MOF model into a transformed MOF model. Accordingly, those rules are totally different from the transformations recited in the claims of the present application which transforms objects in a model in a model into different objects within the same model.

Dependent claims 2-8 recite elements of the transformations recited in claim 1. As Baisley does not disclose any transformation, Baisley does not disclose or suggest those elements recited in claims 2-8.

Therefore, Applicant respectfully submits that the present invention as recited in independent claims 1, 35, 43 and 44 and dependent claims 2-8 have been patentably distinguished over Baisley.

Rejection under 35 USC 103(a) to claims 9-21, 24-33 and 36-42

The Examiner has also rejected claims 9-21, 24-33 and 36-42 under 35 U.S.C. 103(a) stating that these claims are unpatentable over Baisley in view of Fink (US Patent No. 6,490,590 - hereinafter called "Fink"). Applicants respectfully request reconsideration of the rejection based on the reasons set out below.

As discussed above, Baisley does not disclose any metadata model having layers, especially, a data access layer, a business layer and a package layer. Thus, Baisley does not disclose or suggest any transformations for refining or constructing model objects as recited in claim 9. Especially, as the Examiner has

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indicated, Baisley does not teach the refining the business rules. The Examiner has attempted to overcome this deficiency of Baisley with FINK.

Fink discloses generation of a logical data model and physical data model. As shown in Figure 3A, only after the logical data model (LDM) is created (310), a physical data model (PDM) is created (314) "using the GDM tool 300 and the LDM resulting from step 310" (column 6, lines 41-43). In Fink's method, the physical model having a lower degree of abstraction is created after the logical model having a higher degree of abstraction is created. This is totally opposite to the transformations carried out by the metadata model transformer of the present invention, as recited in independent claims 9 and 36.

The transformer as recited in claim 9 comprises "data access to business model transformations" and "business to package model transformations". The data access to business model transformations constructs business model objects (i.e., objects of a higher degree of abstraction) based on the data access model objects (i.e., objects of a lower degree of abstraction). Similarly, the business to package model transformations constructs package model objects (i.e., objects of a higher degree of abstraction) based on the business model objects (i.e., objects of a lower degree of abstraction). Fink does not disclose any transformation which can construct model objects of a higher degree of abstraction based on model objects of a lower degree of abstraction.

The Examiner has referred to the section in Fink that reads "SME refines the business rule metadata to reflect the client's business" (column 8, lines 20-22). This step is illustrated as box 326 labeled "modify metadata" in Figure 3B as a step that is carried out after the creation of the physical data model (314) and other steps. This modification of metadata is external modification carried out by a Subject Matter Expert (SME), i.e., a human. Fink does not disclose or suggest use of any transformation to refine business rules.

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Dependent claims 10-21, 24-33 and 37-42 recite elements or steps of transformations recited in claims 9 or 36. As neither Baisley nor Fink discloses any transformation, neither Baisley nor Fink does not disclose or suggest those elements or steps.

Therefore, even if one skilled in the art combines Baisley and Fink, he would still fail to provide a metadata model transformer or method for transforming a metadata model as recited in claims 9 and 36 and their dependent claims. Thus, the present invention as recited in these claims have been patentably distinguished over Baisley and Fink.

Rejection under 35 USC 103(a) to claims 22 and 23

The Examiner has further rejected claims 22 and 23 under 35 U.S.C. 103(a) stating that these claims are unpatentable over Baisley et al in view of Fink and Henninger et al (US Patent No. 5,499,371 - hereinafter called "Henninger").

Claims 22 and 23 depend on claim 21 which depends on claim 9. As discussed above, claim 9 has patentably distinguished over Baisley and Fink .

As discussed in the previous response, Henninger et al discloses an apparatus for using an object model of an object-oriented application to automatically map information between an object-oriented application and a structured database, e.g., a relational database. As described on column 8, lines 48-53, for each one-to-one and one-to-many relationship in the object model, a foreign key column or foreign key columns are added to the database table schema in the appropriate table of the database schema, and for each many-to-many relationship in the object model, a separate join table is added to the database schema. In these cases, Henninger's method constructs a database schema and a transform, using the object model as input.

The object model of Henninger is not transformed. As shown in Figures 1 and 3, Henninger's method software 15 accepts object model 20 and accepts or creates database schema 30 and transform 50, and using these three elements as input, the method automatically generates source code (column 5, lines 63-65; column 7, lines 29-31). As seen in Step D of Figure 3, Henninger's method constructs a database schema 30 and a transform 50 derived from the object model 20 (column 7, lines 53-55). Thus, Henninger simply uses the input object model 20, and does not modify or transform the object model 20 as part of the process. This is contrary to the present invention that transforms the metadata model. Therefore, the present invention as claimed is totally different from Henninger.
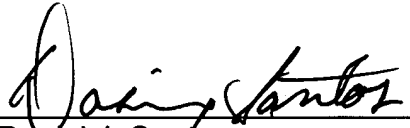
Therefore, claims 22 and 23 are also patentably distinguished over Baisley, Fink and Henninger.

CONCLUSION

In conclusion, Applicant respectfully submit that the present invention as claimed in the claims is patentably distinguished over any combination of the cited references.

For the reasons set forth above, it is respectfully submitted that all pending claims are now in condition for allowance, and Applicant requests a Notice of Allowance be issued in this case. Should there be any further questions or concerns, the Examiner is urged to telephone the undersigned to expedite prosecution.

Respectfully submitted,
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APPENDIX A

| UML
Meta-Meta-Model | MOF
Meta-meta-model |
| UML Based
Meta-model | MOF
Meta-model |

Not disclosed

METADATA MODEL OF
PRESENT INVENTION

MOF MODEL OF
BAISLEY

UMLMODEL OF
BAISLEY